



**UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/536,993	03/29/00	SUEHIRO	M 000296

023850 MMC2/0702
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EXAMINER

PATEL, I

ART UNIT

PAPER NUMBER

2841

DATE MAILED:

07/02/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/536,993

Applicant(s)

SUEHIRO, MITSUO

Examiner

Ishwar B Patel

Art Unit

2841

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 May 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 10-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 1-9 in Paper No. 4 is acknowledged.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

3. Claims 1, 7 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Ellerson et al., U. S. Patent 5,859,470, (hereafter referred to as Ellerson).

Regarding claim 1, Ellerson discloses a printed circuit board unit comprising:

a printed circuit board (a chip carrier 2, see figure 1, column 3, line 45-60);

an electronic component (semiconductor chip 1, see figure 1, column 3, line 45-60);

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a solder bump interposed between the printed circuit board and the electronic component so as to fix the electronic component to the printed circuit board (solder bump 3, see figure 1, column 3, line 45-60); and

an insulated film disposed between the printed circuit board and the electronic component so as to define a through hole for receiving the solder bump (adhesive member 8 located between the chip and the circuit board. Adhesive member 8 includes perforations or vias 9 to permit placement of the solder balls 3 through the film to contact the lower melting solder material 7, see figure 1, column 4, line 60-67).

Regarding claim 7, Ellerson further discloses an outer peripheral size of the solder bump is set smaller than an inner peripheral size of the through hole (see figure 2 and 2A).

Regarding claim 9, Ellerson further discloses a thickness of the insulated film corresponds to a height of the solder bump on the printed circuit bump, see figure 2 and 2A).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2-6 and 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ellerson as applied to claims 1 and 7 above, and further in view of Klein, U. S. Patent 5,930,889.

Regarding claims 2 and 3, Ellerson discloses all the features of the claimed invention except the through hole is designed to form a constriction in the solder bump between the printed circuit board and the electronic component as claimed in claim 2 and the insulated film is superposed on the printed circuit board so as to form the constriction right on a conductive pad on the printed circuit board as claimed in claim 3. However shape and size of the hole in the insulated film is an obvious matter of design choice depending upon the desired performance and the reliability. Further Klein teaches a constriction (smaller hole) in the insulated film 101, see Klein figure 5, insulation layer 101, column 8, line 1-10) for reliable solder reflow. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the circuit board of Ellerson with insulated film having features claimed in claim 2 and 3 as taught by Klein in order to get the desired results.

Regarding claim 4, Ellerson does not explicitly disclose the conductive pad with a surface conductive layer having a corrosion resistance higher than the base conductive layer. However a conductive pad covered with a surface conductive layer having a corrosion resistance higher than the base material is known for the apparent reason of protection of the base layer against corrosion and oxidation. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the modified circuit board of Ellerson with conductive pad with a surface conductive layer having a corrosion resistance higher than the base conductive layer in order to have a better corrosion protection.

Regarding claim 5, Ellerson further discloses the base conductive layer is copper layer (Ellerson – column 4, line 13-20).

Regarding claim 6, Ellerson does not disclose the surface conductive layer is a nickel layer. However nickel is known in the art to be used as a corrosion resistant layer. Further it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the modified circuit board of Ellerson with the nickel surface conductive layer in order to get the desired results.

Regarding claim 8, the modified circuit board of Ellerson does not disclose the inner surface of the through hole is covered with a coating wet to the solder bump. However it is known in the art for better and uniform adherence of the solder to the surface. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the circuit board of Ellerson with an inner surface of the through hole is covered with a coating wet to the solder bump in order to get better adherence of solder to the surface of the through hole.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Panchou et al., Ishida et al., Hashimoto et al., Chong et al., Scholz, Suzuki, Zakel et al., Tsukada et al., Ishida et al, disclose circuit board similar to applicant's claimed invention.

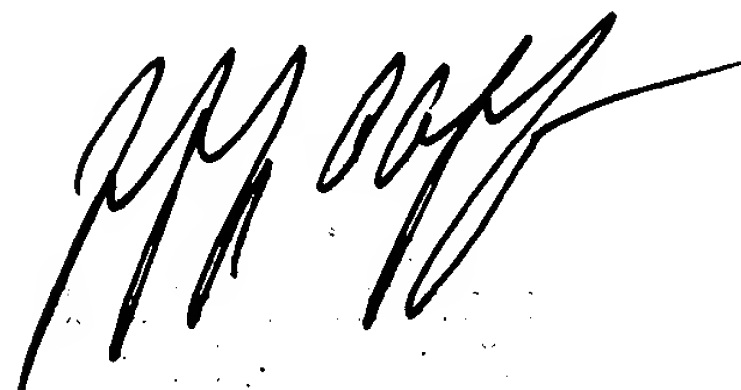
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar B Patel whose telephone number is (703) 305 2617. The examiner can normally be reached on M-F (6:30 - 4) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeffrey Gaffin can be reached on (703) 308 3301. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305 3431 for regular communications and (703) 305 7724 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956.

ibp
June 27, 2001

A handwritten signature in black ink, appearing to be "PP" followed by a stylized flourish.